

the few pages that are dignified by the name are merely a mockery to anyone who is not one of the authors.

However, even with these easily remedied defects, the book is a good and useful one which can be recommended to the student as one to be added to his library.

#### OUR BOOK SHELF.

*Studies in the Cartesian Philosophy.* By Norman Smith, M.A. Pp. xiv + 276. (London: Macmillan and Co., Ltd.; New York: The Macmillan Company, 1902.) Price 5s. net.

THE title of Mr. Smith's book conveys an adequate idea of its scope. The author indicates the lines of his treatment thus:—"In Descartes' system, as we have tried to show, there are three fundamental tenets, viz. the doctrine of representative perception, a very peculiar form of rationalism, and the conception of spirit as an active creative agency" (p. 115). The main portion of the book (pp. 1-115) is devoted to Descartes, with appendices on "Arnauld's denial of the doctrine of representative perception" and on Descartes' views of perception, time and consciousness (pp. 115-136). The rest of the book deals with Cartesian principles in Spinoza, Leibniz and Locke, with Hume's criticism and "the transition to Kant."

The author's treatment is lucid throughout; the main lines of criticism are stated clearly, and, on the whole, adequately. This is especially true of the chapters on Descartes and Locke, where the author has allowed himself to treat the subject at greater length. As to Descartes, the author says, "his philosophy of nature I have reserved for further consideration, and in this present volume limit myself, as far as possible, to his metaphysics" (preface, p. vi). His reason for thus dividing the subject is that Descartes' "metaphysical teaching is perverted by principles wholly at variance with his own positive scientific views" (preface, p. i.). This point is specially brought out in contrasting Descartes' physical and metaphysical views of motion (pp. 70-71).

With regard to the salient features of Descartes' teaching, Mr. Smith considers that the *cogito ergo sum*, so far from being "the really ultimate element in his system," is "simply one consequence of the doctrine of representative perception which is itself a consequence of his dualistic starting point" (p. 14). The importance of "method" as "not merely an instrument for constructing knowledge" (p. 23) and the relation of method to Descartes' view of intelligence is well brought out; the same may be said of the author's treatment of the deductive mathematical method and its fallacies. In "the proof of the existence of God," Mr. Smith thinks "Descartes' scholasticism came to a height." He rightly treats some of the Cartesian arguments as purely "official" (p. 64). But we cannot say that he is altogether clear upon the relation of the system as a whole to God; it may be disputed whether Descartes ever meant by God "the all-comprehensive absolute reality." Certainly we can recognise the universality of the criterion without identifying the system with its maker. The author's argument is scattered and somewhat divided between what Descartes really meant and what he really said.

The discussion on Locke is an excellent chapter; the treatment of "substance" and "the unknown" may be specially mentioned (v. p. 195). The treatment of Spinoza and Leibniz, though suggestive, is too brief. As the value of this book lies not so much in its originality as in the accurate exposition of certain lines of thought which have dominated modern philosophy, the author should not have allowed the recent works on these philosophers to cramp his own treatment. The section on Berkeley

suggests the same criticism. Yet the many good qualities of the book should recommend it to all students of philosophy. It is adequately furnished with references and has a good index. G. S. B.

*Die progressive Reduktion der Variabilität und ihre Beziehungen zum Aussterben und zur Entstehung der Arten.* By Daniel Rosa, Professor of Zoology in the University of Modena. Authorised Translation from the Italian by Dr. H. Bosshard. Pp. 106. (Jena: Gustav Fischer, 1903, published 1902.) Price 2.50 marks.

PROF. D. ROSA begins his interesting essay by saying that cuttlefishes might envy the obscurity which multitudinous evolutionist-pamphlets—likened to "ink-squirts"—have given to the troubled waters surrounding the rock of the theory of descent; but this somewhat cynical outlook has happily not hindered him from publishing (in 1899) the booklet before us or from having it translated into German by Dr. H. Bosshard. We have both versions of the essay, and, so far as we can judge, the translation is exceedingly well done.

In his first chapter, Rosa pictures organic evolution as a long-drawn-out "substitution process," in the course of which many groups, having reached their acme, give place to others springing from a lower level of the phylogenetic stem and retaining a capacity for abundant and far-reaching variation. As a group becomes more perfect, it tends to nirvana; its variations are reduced in number, or, in any case, in range; and the extinction of "lost races" like Graptolites, Trilobites, Ammonoids, Pterodactyls, &c., is causally associated with a progressive reduction of variation. It has to be admitted, however, that we do not really know much about the scope of variation in the last days of lost races.

In the second chapter, Rosa inquires whether the progressive reduction of specific variations is wholly due to natural selection or in part also to internal organismal conditions. He emphasises two points:—(1) that an organ which disappears in the course of evolution never reappears along that line of descent, that an organ which has become retrogressive never reacquires the capacity of progress; and (2) that in many cases, there is a constancy or fixity in the numerical relations of parts, e.g. segments, limbs and digits, from which the type seems quite unable to free itself. These two sets of facts point to a progressive reduction of variability, especially in types towards the ends of the phyletic branches. This theory is corroborated by detailed reference to the limitations which structural and functional differentiation seems to impose upon the variability of tissues and cells. Evolution is dominated by the "law of progressively reduced variability."

The third chapter is less of a unity, for the author has been impelled to speak briefly "de omni re scibili et de quibusdam aliis." Rosa attaches little importance to individual fluctuations; he relies upon general changes or mutations of the idioplasm occurring throughout the species. He has done useful service in indicating the tendency to reduction of variability in highly evolved types; his essay is very interesting and suggestive, pleasantly free from dogmatism or verbal polemics; but we must wait for more detailed data, and admit that "Thatsachen, nicht Ansichten, entscheiden."

J. A. T.

*Steel Ships: their Construction and Maintenance. A Manual for Shipbuilders, Ship Superintendents, Students and Marine Engineers.* By Thomas Watson. Pp. xiv + 290. (London: Charles Griffin and Co., Ltd., 1901.) Price 18s. net.

THE title of this work led us to hope that a long-felt want had at length been supplied; but we regret to have to say that on reading it we were disappointed. Mr. Watson does not appear to have the scientific

knowledge or the range of practical experience requisite for the task he has undertaken. He attempts within the narrow limits of eight chapters running to 286 pages—of which one chapter of only sixteen pages is devoted to “maintenance”—to deal with such great subjects as the manufacture of steel and iron; the quality, strength and tests of these materials; the classification of ships and the assignments of their loadlines; the various methods of ship construction; the strength of ships and the stresses to which they are subjected at sea; the types of ships and the construction of typical vessels; the details of construction of ships and their fittings; and the maintenance of ships during their employment at sea. These are all most important subjects, and greatly need adequate treatment by someone who thoroughly understands them and can make them understood by others. Mr. Watson has certainly failed to do what is required.

The various points are treated in this work chiefly with reference to cargo steamers built to Lloyd's rules, and there is little in some of the chapters except what is contained in those rules. The “laying off” of a vessel upon the mould loft floor, and the manner of giving out particulars of the forms of the various parts of the structure to the workmen, is described in two pages, in a general manner that conveys no really useful information. Similarly, the launching arrangements, and the calculations requisite for them, are only glanced at in a very brief and sketchy manner. The subject of bilge keels is dealt with in twenty lines, and the question of how to place these properly in position upon the ship is dismissed with the remark that they “should be placed so as to give the least possible resistance to propulsion.” A student would like to have some guide to that position! In dealing with the subject of vibration of steamships, the author recommends, as a provision against it, the strengthening of parts of the structure in and near the engine-room; and he makes no reference to the most important precaution of all—which has been much studied of late by marine engineers—that of designing the engines so as to obtain as perfect a balance as possible of the reciprocating parts.

The chapter upon “Stress and Strength” is very unsatisfactory, owing to an apparent want of scientific grasp of this difficult and intricate subject. We hope that the “shipbuilders, ship superintendents, students and marine engineers” for whom this work is said to be intended will soon be supplied with fuller and more exact information than is here presented to them.

*Elementi di Geografia Fisica, Fisica Terrestre e Meteorologia, ad uso delle Scuole Classiche, Tecniche, Normali ed Agrarie.* By Prof. Francesco Porro. Pp. viii + 280. (Turin, Rome, &c.; G. B. Paravia & Co., 1902.)

PROF. PORRO dedicates his little book “a mio figlio Giannino,” a distinct novelty in school-book prefaces. The book itself devotes more space to the atmosphere, the oceans and glaciers than is usual in elementary works on physical geography. The features of the land are dealt with in much less detail, while the usual introduction on astronomical matters one expects to find in an English school book of the kind, and the usual appendix on biological matters, are omitted altogether. The result is that it is possible, in a limited space, to give a very satisfactory outline of the departments which are selected for treatment.

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Prof. Porro writes as a lover of nature, with a subdued enthusiasm that should prove contagious. He has a good knowledge of the literature of his subject, makes his references accurate, and knows how to choose really instructive photographs and to construct helpful diagrams as illustrations.

H. R. M.

## LETTERS TO THE EDITOR.

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### Cambridge Mathematics.

PROF. GREENHILL'S notice (p. 338) of the German translation of my “Calculus” is pleasant enough reading. He says I follow the method of Squeers, “Spell winder! Now go and clean it.” He is nearly right, but in truth I act on the belief that the average English boy loves to learn by doing things first and thinking about them afterwards, and so my method is rather the reverse of that of Squeers. Again, “the book, as a series of events connected by a slight thread of continuous theory, suggests a mathematical Pickwick.” This is acute and severe and good humoured and kindly. I hope that Cambridge men, as they believe in Prof. Greenhill's great knowledge and good sense, will also see his kindly feeling, and that they will not think me presumptuous in urging them to consider his advice seriously. It will be gathered that I do not myself think that my course of mathematics for engineers is more than a promising effort. I am very much alive to its defects. But I know that the idea on which I have been working is a good one; I carefully developed that idea in opening the discussion at the Glasgow British Association meeting (published by Messrs. Macmillan). It is an idea as well known as the commonest copy-book maxim, but it is as much ignored at our colleges and schools as the sixth and eighth Commandments were in Blackbeard's ship. Anyone who studies how Prof. Forsyth has transformed my copy-book-maxim-ideas of elementary mathematics teaching so that they have become acceptable to all the schoolmasters of the country, and have in a few months been adopted by many examining bodies, must see that it is useless for anybody outside Cambridge to do more than say more and more strongly and persistently how much Cambridge is ignoring certain obvious truths; how Cambridge is neglecting its duty of leadership of this country in mathematics teaching.

I have pointed out how the engineer needs mathematics in all his work; how he needs the ideas of the infinitesimal calculus, and yet how mathematical symbols have been made hateful to him, his very desire for mathematical knowledge having in many cases been taken a devilish advantage of by self-sufficient dull pedants. How the engineer, clear-eyed and eager to use tools which he knows by trial will never fail him, and scornful of all method which he has by trial found to be mere pretence, has got to loathe mathematics and theory;—is it not written in the pages of every engineering journal that is published? And yet we know that all engineering is built upon mathematics, that all great advances in engineering are made by those practical engineers who accidentally become able to compute, to use the more celestial weapon. When, as at the Royal College of Science, there is an endeavour made to construct a syllabus suitable for the mathematical instruction, not merely of the average, but also of the highest kind of engineer and physicist, the necessity for making sacrifice and obeisance to outside standards well-nigh defeats our efforts. We ask Cambridge to help us towards that freedom without which there can be no true education.

Cambridge leads England in mathematics, and she is at present very far, not only from my ideal of leadership, but also from the ideal of Prof. Greenhill, who knows the state of the mathematical world many times better than I do. I ask Cambridge men, our best mathematicians, the men